Maryland Geological Survey

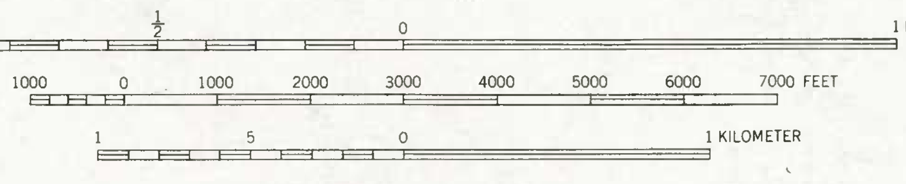
MAP 2. SLOPE OF LAND SURFACE

Quadrangle Atlas No. 7

EXPLANATION

This map shows the slope of the land surface in the Reisterstown quadrangle, with the slope values grouped into categories. The map was prepared from a 1:24,000-scale topographic contour plate using a semi-automatic photomechanical process. In this process, a device measures the distance between adjacent lines and, for the contour interval provided, calculates the slope between the lines. Narrow summits or depressions and similar features may be falsely mapped due to the bending of a line upon itself. Likewise, equal but adjacent contours produce overestimated slopes. Widely separated contour lines may result in an averaging of the intervening slopes. These limitations are only of small extent. The slope categories, which relate to those in the Baltimore County Soil Survey, were selected for their relevance to current and contemplated Baltimore County planning regulations.

SCALE 1:24000

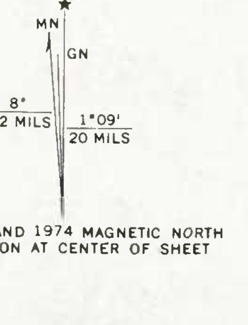


CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

1983

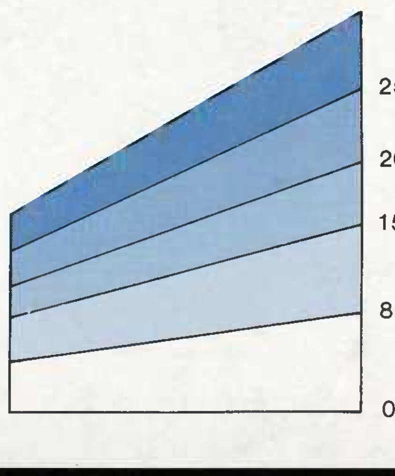
Prepared in cooperation with the United States Geological Survey and the Baltimore County Department of Planning And Zoning.

QUADRANGLE LOCATION



UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

Prepared by **Photo Science, Inc.**, Gaithersburg Maryland. Utilizing contour negatives, furnished by United States Geological Survey.



LOCATIONS OF WELLS AND SPRINGS

By

Mark T. Duigon and John T. Hilleary

EXPLANATION

Information for wells appearing on this map is tabulated in the Maryland Geological Survey Basic Data Report No. 1 (Laughlin, 1966). Supplementary wells are tabulated in this atlas and this information has been entered in the National Water Data Storage and Retrieval System (WATSTORE) of the U.S. Geological Survey. Records of test holes and borings are on file with the USGS, Towson, Md.

Since 1945, the State of Maryland has required a permit to drill a water well. The numbers corresponding to the permit applications are included in the well-data tabulations. Since 1973, these numbers have appeared on tags affixed to the well casings. Well drillers are required to provide certain information regarding intended use and depth of well when applying for the permit, and actual depth and discharge information upon completion of the well. Well drillers obtain discharge data by various methods, such as using a meter that measures discharge, filling a bucket, or by estimation. Most of the well data analyzed for this report were obtained from the permit-application and well-completion forms submitted to the State by the well drillers.

Wells are identified in accordance with a State-wide numbering system. Each county is set up with a grid system based on every fifth minute of latitude and longitude. Each square of the grid is lettered by row and column. Thus, quadrangle DB is the fourth row from the north and second column from the west. Wells and springs are given letter-number designations, which identify the county, the 5-minute quadrangle, and the well. For example, well BA-DB 126 is in Baltimore County, in the 5-minute quadrangle DB and is the 126th well inventoried in that quadrangle.

WELL AND NUMBER

○ 123

SPRING AND NUMBER

ϭ 24

REFERENCES

Dingman, R. J., Ferguson, H. F., and Martin, R. O. R., 1956, The water resources of Baltimore and Harford Counties: Maryland Department of Geology, Mines and Water Resources 1/ Bulletin, v. 17, 233 p.

Laughlin, C. P., 1966, Records of wells and springs in Baltimore County, Maryland: Maryland Geological Survey Water Resources Basic Data Report No. 1, 406 p.

1/ The name of this agency was changed to the Maryland Ceological Survey in June 1964.

SUPPLEMENTAL RECORD OF WELLS

LOCAL NUMBER	STATE PERMIT NUMBER	OWNER	CONTRACTOR	DATE COMPLETED	ALTITUDE OF LAND SURFACE (FEET)	DEPTH OF WELL (FEET)	FINISH	DEPTH CASED (FEET)	CASING DIAMETER (INCHES)	PRINCIPAL AQUIFER	WATER LEVEL (FEET)	DRAW-DOWN (FEET)	DISCHARGE (GALLONS PER MINUTE)	DATE DISCHARGE MEASURED	PUMPING PERIOD (HOURS)	SPECIFIC CAPACITY (GPM/FT)	USE OF WATER	USE OF SITE	TYPE OF LIFT
BA DA 82	BA-73-3107	LAMBERT, ROB	W W REICHART	07/22/1976	525	125.00	X	40	6	300PNRN	42.00	40	8.0	07/22/1976	6.0	0.2	H	W	S
BA DA 83	BA-73-4369	WERTZ BROS INC	H DILLON	06/10/1977	680	400.00	X	50	6	300PNRN	50.00	330	2.0	06/10/1977	6.0	0.0	H	W	S
BA DA 84	BA-73-2675	B S U ASSOC	L EASTERDAY	01/21/1976	570	120.00	X	68	6	300SKVL	40.00	--	15	01/21/1976	6.0	--	H	W	S
BA DA 85	BA-73-4370	WERTZ BROS INC	H DILLON	06/10/1977	525	165.00	X	40	6	300SKVL	40.00	110	5.0	06/10/1977	6.0	0.0	H	W	S
BA DA 86	BA-73-4828	RYLAND HOMES	WATER INC	09/07/1977	680	205.00	X	40	6	300PNRN	40.00	25	3.0	09/07/1977	6.0	0.1	H	W	S
BA DA 87	BA-73-4837	RYLAND GROUP	WATER INC	11/01/1977	600	235.00	X	41	6	300SKVL	46.00	16	2.0	11/01/1977	6.0	0.1	H	W	S
BA DA 88	BA-73-1448	GATEWAY DEVELOP	WATER INC	06/06/1974	685	262.00	X	54	6	300LCRV	40.00	30	2.0	06/06/1974	6.0	0.1	H	W	S
BA DA 90	BA-73-4387	VILLA DEVELOP	H DILLON	05/09/1977	720	245.00	X	39	6	300LCRV	35.00	195	4.0	05/09/1977	6.0	0.0	H	W	S
BA DA 91	BA-73-4731	STANDARD REALTY	L EASTERDAY	08/15/1977	645	340.00	X	28	6	300SKVL	35.00	65	2.0	08/15/1977	6.0	0.0	H	W	S
BA DA 92	BA-73-4721	RIDDLE, MARK	L EASTERDAY	08/15/1977	645	120.00	X	38	6	300SKVL	30.00	20	8.0	08/15/1977	6.0	0.4	H	W	S
BA DA 93	BA-73-3800	BROADBENT, SCOTT A	DANA KYKER	01/22/1977	665	153.00	X	47	6	300SKVL	70.00	46	12	01/22/1977	6.0	0.3	H	W	S
BA DA 94	BA-73-3532	VANDERWOORT, JOAN	G EDGAR HARR	10/21/1976	600	150.00	X	58	6	300SKVL	13.00	2	6.0	10/21/1976	6.0	3.0	H	W	S
BA DA 95	BA-73-3864	VILLA DEVELOP	H DILLON	05/09/1977	705	200.00	X	28	6	300LCRV	35.00	40	25	05/09/1977	6.0	0.6	H	W	S
BA DA 96	BA-73-3215	LABOO CONST CO	C C CAMPBELL	07/09/1976	705	285.00	X	43	6	300LCRV	100.00	125	2.0	07/09/1976	6.0	0.0	H	W	S
BA DA 97	BA-73-2679	SUNNYBROOK HOME	WATER INC	03/24/1976	685	250.00	X	29	6	300LCRV	35.00	10	2.0	03/24/1976	6.0	0.2	H	W	S
BA DA 98	BA-73-2245	SHEWLL, RALPH	H DILLON	07/14/1975	685	150.00	X	27	6	300LCRV	30.00	70	20	07/14/1975	6.0	0.3	H	W	S
BA DA 99	BA-73-1650	SICKLE, A J	JOHN GREENE	10/05/1974	685	245.00	X	67	6	300LCRV	45.00	15	2.0	10/05/1974	6.0	0.1	H	W	S
BA DA 100	BA-73-3830	VILLA DEV CORP	H DILLON	01/11/1977	680	175.00	X	42	6	300LCRV	25.00	45	15	01/11/1977	6.0	0.3	H	W	S
BA DA 101	BA-73-4043	GLOVER, JAMES F	A C REIDER	03/09/1977	610	200.00	X	18	6	300SKVL	67.00	90	2.0	03/09/1977	6.0	0.0	H	W	S
BA DA 102	BA-73-4259	SCHINDLER, ALLEN	C C CAMPBELL	05/03/1977	625	185.00	X	36	6	300SKVL	30.00	10	3.0	05/03/1977	6.0	0.3	H	W	S
BA DA 103	BA-73-4134	BERENHOLTZ, JEROME	A P EDMONDSN	06/19/1977	670	103.00	X	43	6	300PNRN	5.00	70	7.0	06/19/1977	8.0	0.1	H	W	S
BA DA 104	BA-73-4136	BERENHOLTZ, JEROME	A P EDMONDSN	1977	690	160.00	X	40	6	300SKVL	45.00	40	6.0	1977	8.0	0.2	H	W	S
BA DA 105	BA-73-2988	DEFELICE, JOHN	WATER INC	06/08/1976	690	262.00	X	42	6	300PNRN	35.00	5	3.0	06/08/1976	6.0	0.6	H	W	S
BA DA 106	BA-73-2625	HASTINGS, THOMAS	G EDGAR HARR	12/16/1975	625	125.00	X	41	6	300PNRN	20.00	12	12	12/16/1975	6.0	1.0	H	W	S
BA DA 107	BA-73-2532	TIMBERFIELD	DANA KYKER	10/30/1975	625	130.00	X	43	6	300PNRN	52.00	10	6.0	10/30/1975	6.0	0.6	H	W	S
BA DA 108	BA-73-1578	BLUM, B H	L EASTERDAY	08/06/1974	645	170.00	X	70	6	300PNRN	39.00	46	5.0	08/06/1974	6.0	0.1	H	W	S
BA DA 109	BA-73-1194	JACKSON, JOHN	DANA KYKER	01/17/1974	570	130.00	X	63	6	300SKVL	40.00	90	8.0	01/17/1974	7.0	0.1	H	W	--
BA DA 110	BA-73-0872	RUSSEL, JAMES JR	H J DILLON	07/30/1973	680	175.00	X	35	6	300PNRN	40.00	85	8.0	07/30/1973	6.0	0.1	H	W	S
BA DA 115	BA-73-3539	L W RETER CO	W W REICHART	10/15/1976	665	125.00	X	69	6	300PNRN	50.00	10	8.0	10/15/1976	6.0	0.8	H	W	S
BA DB 224	BA-73-2598	SCHNIDER, GEORGE	C C CAMPBELL	12/23/1975	680	185.00	X	78	6	300LCRV	30.00	30	2.0	12/23/1977	6.0	0.1	H	W	S
BA DB 225	BA-73-0585	BLUM, B H	L EASTERDAY	04/19/1973	678	420.00	X	21	6	300LCRV	42.00	58	3.0	04/19/1973	6.0	0.1	H	W	--
BA DB 226	BA-73-1349	BLUM, B H	L EASTERDAY	04/10/1974	660	140.00	X	38	6	300LCRV	35.00	105	4.0	04/10/1974	6.0	0.0	H	W	S
BA DB 227	BA-73-0559	BLUM, B H	L EASTERDAY	04/30/1973	675	120.00	X	33	6	300LCRV	40.00	1	5.0	04/30/1973	6.0	5.0	H	W	S
BA DB 228	BA-73-3684	CHER CHRIS CONS	G EDGAR HARR	04/25/1977	690	410.00	X	33	6	300LCRV	44.00	158	2.0	04/25/1977	6.0	0.0	H	W	S
BA DB 229	BA-73-3684	CHER CHRIS CONS	G EDGAR HARR	04/ /1977	690	200.00	--	--	--	300LCRV		--	0.00	04/ /1977	--	--	--	Z	--
BA DB 230	BA-73-2935	COLONY HOMES	G EDGAR HARR	05/28/1976	540	250.00	X	44	6	300CCKV	39.00	7	2.0	05/28/1976	6.0	0.3	H	W	S
BA DB 231	BA-73-2496	ENSOR BLDG CO	G EDGAR HARR	03/31/1976	550	350.00	X	50	6	300CCKV	45.00	--	10	03/31/1976	6.0	--	H	W	S
BA DB 232	BA-73-2490	ENSOR BLDG CO	G EDGAR HARR	02/20/1976	670	560.00	X	100	6	300LCRV	42.00	122	2.0	02/20/1976	6.0	0.0	H	W	S
BA DB 233	BA-73-2825	ENSOR BLDG CO	G EDGAR HARR	05/26/1976	650	175.00	X	154	6	300LCRV	30.00	5	12	05/26/1976	6.0	2.4	H	W	S
BA DB 234	BA-73-2555	WEAVER, HOWARD	DANA KYKER	08/06/1977	555	265.00	X	61	6	300CCKV	14.00	205	3.5	08/06/1977	6.0	0.0	H	W	S
BA DB 235	BA-73-3645	CHER CHRIS CONS	G EDGAR HARR	12/01/1976	700	300.00	X	44	6	300LCRV	35.00	189	2.0	12/01/1976	6.0	0.0	H	W	S
BA DB 236	BA-73-1654	BLUM, B H	L EASTERDAY	09/11/1974	650	300.00	X	23	6	300LCRV	16.00	273	2.0	09/11/1974	6.0	0.0	H	W	S
BA DB 237	BA-73-2362	TIMBERFIELD INC	DANA KYKER	02/02/1976	560	245.00	X	55	6	300LCRV	34.00	138	5.0	02/02/1976	6.0	0.0	H	W	S
BA DB 238	BA-73-2411	TIMBERFIELD INC	DANA KYKER	09/15/1975	610	280.00	X	43	6	300LCRV	30.00	51	2.0	09/15/1975	6.0	0.0	H	W	S
BA DB 239	BA-73-2554	GAMERMAN, ALFRED	DANA KYKER	10/31/1975	555	310.00	X	74	6	300LCRV	53.00	245	2.7	10/31/1975	6.0	0.0	H	W	S
BA DB 240	BA-73-3269	TIMBERFIELD INC	DANA KYKER	06/24/1976	700	400.00	X	55	6	300LCRV	80.00	180	3.0	06/24/1976	6.0	0.0	H	W	S
BA DB 241	BA-73-3459	TIMBERFIELD INC	DANA KYKER	10/13/1976	710	415.00	X	43	6	300LCRV	69.00	198	7.0	10/13/1976	6.0	0.0	H	W	S
BA DB 242	BA-73-3885	CHER CHRIS CONS	G EDGAR HARR	09/15/1977	630	350.00	X	42	6	300LCRV	35.00	11	2.0	09/15/1977	6.0	0.2	H	W	S
BA DB 243	BA-73-3881	CHER CHRIS CONS	G EDGAR HARR	08/02/1977	630	250.00	X	--	--	300LCRV	--	--	3.0	08/02/1977	--	--	H	W	S
BA DB 244	BA-73-3825	CHER CHRIS CONS	G EDGAR HARR	10/06/1977	640	225.00	X	42	6	300LCRV	45.00	22	2.0	10/06/1977	6.0	0.1	H	W	S
BA DB 245	BA-73-3823	CHER CHRIS CONS	G EDGAR HARR	11/07/1977	660	590.00	X	42	6	300LCRV	84.00	498	2.0	11/07/1977	6.0	0.0	H	W	S
BA DB 246	BA-73-3791	CHER CHRIS CONS	G EDGAR HARR	05/18/1977	670	600.00	X	56	5	300LCRV	48.00	352	2.0	05/18/1977	6.0	0.0	H	W	S
BA DB 247	BA-73-3791	CHER CHRIS CONS	G EDGAR HARR	05/18/1977	670	--	--	--	--	300LCRV	--	--	4.00	05/18/1977	--	--	--	Z	--
BA DB 248	BA-73-4222	SUNNYBROOK HOME	D L JOHNSON	08/05/1977	630	100.00	X	32	6	300LCRV	24.00	--	10	08/05/1977	8.0	--	H	W	S
BA DB 249	BA-73-4217	SUNNYBROOK HOME	D L JOHNSON	07/22/1977	630	103.00	X	45	6	300LCRV	16.00	--	10	07/22/1977	8.0	--	H	W	S
BA DB 250	BA-73-4219	SUNNYBROOK HOME	D L JOHNSON	07/02/1977	660	100.00	X	40	6	300LCRV	40.00	--	14	07/02/1977	8.0	--	H	W	S
BA DB 251	BA-73-3396	OWINGS, JOHN JR	L EASTERDAY	08/25/1976	645	200.00	X	33	6	300LCRV	32.00	48	5.0	08/25/1976	6.0	0.1	H	W	S
BA DB 252	BA-73-4702	HARRISON, CHARLES	D L JOHNSON	09/06/1977	645	100.00	X	52	6	300LCRV	37.00	--	10	09/06/1977	8.0	--	H	W	S
BA DB 253	BA-73-2807	GATEWAY DEV INC	A P EDMONDSN	07/14/1976	640	280.00	X	40	6	300LCRV	26.00	--	7.0	07/14/1976	8.0	--	H	W	S
BA DB 254	BA-73-2809	GATEWAY DEVELOP	A P EDMONDSN	04/20/1976	640	100.00	X	23	6	300LCRV	22.00	13	9.0	04/20/1976	6.0	0.7	H	W	S
BA DB 255	BA-73-3152	TRIAD HOME BLD	DANA KYKER	07/01/1976	625	100.00	X	21	6	300LCRV	25.00	25	25	07/01/1976	6.0	1.0	H	W	S
BA DB 256	BA-73-1842	HOPKINS, ROBERT W	A C REIDER	12/30/1974	670	200.00	X	76	6	300LCRV	37.00	38	7.0	12/30/1974	6.0	0.2	H	W	S
BA DB 257	BA-73-3803	SPRINKLE, ALICE	C C CAMPBELL	02/11/1977	660	280.00	X	35	6	300LCRV	70.00	80	1.0	02/11/1977	6.0	0.0	H	W	S
BA DB 258	BA-73-0491	ROBERTS, GEORGE	H DILLON	03/08/1973	645	100.00	X	25	6	300LCRV	25.00	50	15	03/08/1973	6.0	0.3	H	W	S
BA EA 79	BA-73-5129	MOODY, RODNEY	DANA KYKER	10/29/1977	580	262.00	X	27	6	300UMFC	72.00	151	8.0	10/29/1977	6.0	0.1	H	W	S
BA EA 80	BA-73-3835	KIRK, ROBERT	L EASTERDAY	06/25/1973	670	140.00	X	18	6	300UMFC	40.00	60	4.8	06/25/1973	7.0	0.1	H	W	S
BA EA 81	BA-73-3895	GIBSON, JACK F	WM LEONARD	06/14/1977	530	215.00	X	43	6	300SKVL	25.00	40	7.0	06/14/1977	6.0	0.1	H	W	S
BA EA 83	BA-73-5163	STONESIFER HOME	G EDGAR HARR	11/09/1977	525	150.00	X	35	6	400BLMR	35.00	85	10	11/09/1977	6.0	0.1	H	W	S
BA EA 84	BA-73-5233	REHNISCH, ALBERT	H DILLON	12/09/1977	610	300.00	X	45	6	300DELL	28.00	270	3.0	12/09/1977	6.0	0.0	H	W	S
BA EB 284	BA-73-3530	CROOKS, JOHN JR	H DILLON	10/06/1976	580	150.00	X	21	6	400BLMR	30.00	110	4.0	10/06/1976	6.0	0.0	H	W	S
BA EB 285	BA-73-2467	LAUTENBACH, WAYNE D	N J DILLON	09/06/1975	570	175.00	X	63	6	400BLMR	35.00	100	--	09/06/1975	6.0	0.2	H	W	S
BA EB 286	BA-73-2981	LATHE, MIKE	N J FRANK	07/13/1976	540	190.00	X	100	6	300LCRV	83.00	15	10	07/13/1976	2.0	1.2	H	W	S
BA EB 287	BA-73-4360	RAFFERTY, JOHN	H DILLON	05/24/1977	570	220.00	X	42	6	300LCRV	25.00	15	2.0	05/24/1977	6.0	0.1	H	W	S
BA EB 288	BA-73-5154	RAINER, JAMES	H DILLON	12/14/1977	600	200.00	X	73	6	300DELL	30.00	150	3.0	12/14/1977	6.0	0.0	H	W	S

FINISH CODES
X OPEN HOLE

PRINCIPAL AQUIFER CODES
300PNRN PINEY RUN FORMATION
300SKVL SYKESVILLE FORMATION
300LCRV LOCH RAVEN SCHIST
300CCKV COCKEYSVILLE MARBLE
300UMFC ULTRAMAFIC ROCKS
400BLMR BALTIMORE GNEISS
300DELL DELLA FORMATION

WATER USE CODES
H DOMESTIC

SITE USE CODES
W WITHDRAWAL
Z DESTROYED

LIFT TYPE CODES
S SUBMERSIBLE

SUPPLEMENTAL RECORD OF SPRINGS

NUMBER	OWNER	ALTITUDE	TOPOGRAPHIC SETTING	AQUIFER	USE	REMARKS
BA-DA 119	Montrose School for girls	600'	Upland draw	Piney Run Fm.	Institution	Discharges to pond that supplies school

HYDROGEOLOGIC ATLAS REISTERSTOWN QUADRANGLE BALTIMORE COUNTY, MARYLAND

Maryland Geological Survey

MAP 3. LOCATIONS OF WELLS AND SPRINGS

Quadrangle Atlas No. 7

Topography from aerial photographs by photogrammetric methods. Aerial photographs taken 1943. Field checked 1944. Culture revised by the Geological Survey 1953. Photorevised 1974.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MARYLAND
QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Department of Planning and Zoning.

1983

Maryland Geological Survey

MAP 4. DEPTH TO WATER TABLE

Quadrangle Atlas No. 7

DEPTH TO WATER TABLE

By Mark T. Duigon

EXPLANATION

This map shows the distance from the land surface to the water table (top of the zone of saturation), based primarily on well-drillers' completion reports. The drillers note the static level (depth to the water table when not affected by pumping) in the wells they drill. These data were supplemented by soils maps and field observations of springs, swamps, and other natural features. The map shows that the water table is generally shallowest adjacent to streams, and deepest under summits of hills and ridges.

The water table is part of a dynamic system and responds to various factors, chiefly precipitation and evapotranspiration. The water table is usually highest in the spring and lowest in late summer. Although precipitation tends to raise the water table, much of this water is removed before reaching the water table. Plants absorb moisture from the soil and discharge it into the atmosphere as water vapor (transpiration). This process, combined with evaporation from the soil, results in a net decline in the water table during the growing season. Springs can sometimes indicate fluctuations in the water table. When a spring flows, it indicates that the water table is at the land surface. Cessation of the spring's flow may indicate that the water table has declined below the land surface. This map is generalized to present an estimate of the average depth to the water table.

Figure 1 shows a 19-year record of water levels in well BA-CE 21 measured periodically by the U.S. Geological Survey. This well, located near Jacksonville, Md., is 350 ft deep and is in the garnet-staurolite-kyanite facies of the Loch Raven Formation (part of the Wissahickon Group). Seasonal variations are readily apparent; the long record shows that there is also some variation in annual mean levels. Figure 2 indicates the percentage of water-level measurements that were at or above a given stage for the same well. The median level is about 18 ft below the land surface, meaning that about half the time the level is at or above that value.

Pumping of wells produces a temporary lowering of the water table (drawdown), but, in this region, the effect is usually restricted to the immediate vicinity of the well. The amount of drawdown varies considerably, depending on the hydrologic properties of the aquifer, pumping rate, and length of pumping period. The amount of drawdown is an important factor in planning the location of the pump intake in the well.

In some areas, rainwater that seeps into the ground encounters an impermeable barrier and saturates the soil above it, although the material below the barrier remains unsaturated. The surface of the saturated zone above the impermeable barrier is known as a perched water table. In this area, such zones of saturation are usually of small extent and temporary. They are not shown on this map.

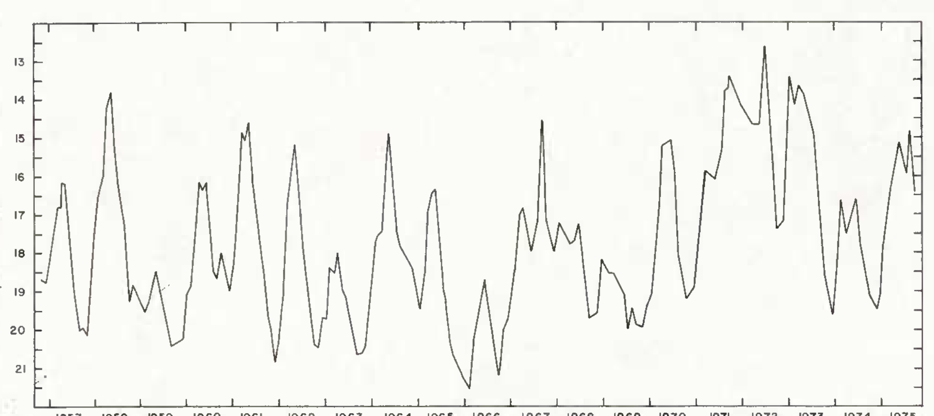


Figure 1. -- Hydrograph for well BA - CE 21, Jacksonville.

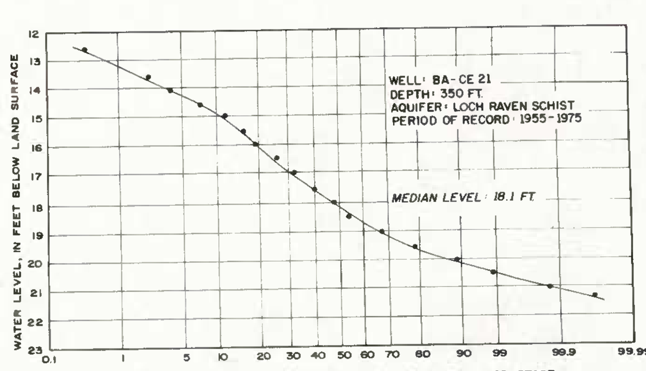


Figure 2. -- Water-level duration curve, well BA-CE 21, Jacksonville.

APPROXIMATE DEPTH TO WATER TABLE IN FEET BELOW LAND SURFACE

Less than 10 Feet

10 - 35 Feet

Greater than 35 Feet

Topography from aerial photographs by photogrammetric methods. Aerial photographs taken 1943. Field checked 1944. Culture revised by the Geological Survey 1953. Photorevised 1974.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Department of Planning and Zoning.

1983

Maryland Geological Survey

MAP 5. AVAILABILITY OF GROUND WATER

Quadrangle Atlas No. 7

AVAILABILITY OF GROUND WATER

By Mark T. Duigon

In the crystalline metamorphic rocks of the Piedmont province, ground water occurs chiefly in fractures. Water infiltrating from the overlying unconsolidated material enters and moves along these fractures. Intersecting fractures allow greater quantities of water to be extracted. Fractures tend to become fewer in number and tighter with increased depth (LeGrand, 1954); consequently, the rate at which water can flow through the rocks is decreased. Therefore, drilling below 300 ft is unlikely to result in significantly higher yields. Davis and Turk (1964) present a method for determining the optimum depth of water wells in crystalline rocks, considering both hydrologic and economic factors.

Water is also contained in the pore spaces of the unconsolidated material overlying the bedrock. This overburden may consist of saprolite (weathered rock material) or material deposited by streams or mass wasting. Most of the water from Piedmont aquifers comes from storage in the overburden. The rate at which this stored water enters the underlying rock depends on that rock's ability to transmit water; this controls the maximum pumping rate of a well. Some older wells are completed in the unconsolidated material, but they face a greater chance of being contaminated than do wells finished in fresh rock and properly cased and grouted.

The overburden provides renovation for downward-percolating water. Fractures in the rocks have little renovation capacity, and, if contaminated water enters the system of interconnected fractures, it can travel significant distances without adequate purification.

The primary criterion for selecting a site for a successful well is topography. Although the availability of ground water is closely related to the presence of fracture zones, such zones can be difficult to recognize with certainty. Topography is related in part to fracture zones and can be readily assessed on a topographic map or in the field. Topography also affects recharge. Wells in valleys and draws tend to have greater yields, whereas those on hilltops are generally deeper and less productive.

Rock type may be related to well yield. Variations in rock strenth and mineralogy affect its susceptibility to fracturing and weathering, which control water storage and transmission.

An analysis of linear features aids in selecting optimum well sites. In some places, these features, called lineaments, are related to zones of more intense fracturing. These features are identified by linear segments of stream channels, linear soil or vegetation tonal patterns, and alinement of some geologic features. They can be seen on topographic maps and aerial photographs, but need to be field-checked for verification. Although fractures can occur anywhere, the probability of drilling a well that will intersect at least one water-bearing fracture is increased by choosing a site that is suspected of being in a zone of greater fracture density.

EXPLANATION

The ground-water availability units presented on this map are based on statistical evaluation of reported specific capacities (discharge, in gal/min, divided by drawdown, in ft) of wells grouped by geologic unit. The geologic units correspond to the mapping units of map 1. Because specific capacity depends in part on the length of test, only wells that have been tested by pumping for a 3-hour-minimum duration were included in the analyses. The groups were tested for significant (95-percent confidence level) differences by the Kruskal-Wallis and Wilcoxon nonparametric tests (Sokol and Rohlf, 1969; Rohlf and Sokol, 1969). The results suggest the presence of three groups in the Reisterstown quadrangle. These groups are described below.

GEOHYDROLOGIG UNIT 1, not present in this quadrangle, is composed of Goastal Plain sediments.

2

GEOHYDROLOGIC UNIT 2: This unit is composed of the massive metadolostone member of the Cockeysville Marble, forming a part of the Worthington Valley. Elsewhere it is made up of what has been mapped as undifferentiated Gockeysville Marble in the Caves and Ghattolanee Dome areas. Because of the limited number of wells in this rock type in the quadrangle, data from elsewhere in Baltimore County were included for analysis.

Reported yields of 17 such wells range from 4 to 60 gal/min. Median yield is 10 gal/min, and mean yield is 15 gal/min. Figure 1 shows distribution of well yields calculated from specific capacities. Specific capacities range from 0.11 to 2.06 (gal/min)/ft and the median is 0.60 (gal/min)/ft. Well depths range from 50 to 259 ft below land surface. Median depth is 111 ft.

Wells drilled in unit 2 will generally be adequate for domestic use, and, with proper construction and design may serve for some municipal, commercial, or some industrial supplies. Flooding is a possible hazard because the unit occupies a valley. Flood waters can damage equipment if suitable precautions are not taken, and contamination by surface waters can occur if the well casing is not properly driven into unweathered rock and grouted.

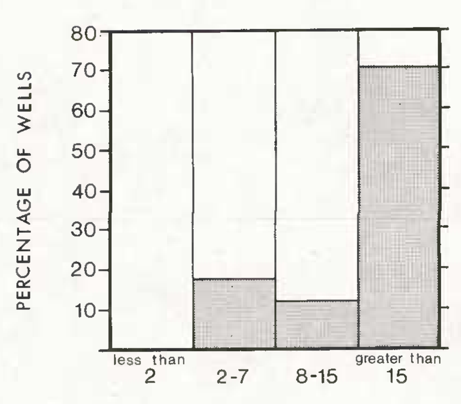


Figure 1. -- Distribution of well yields, Geohydrologic Unit 2 (17 wells).

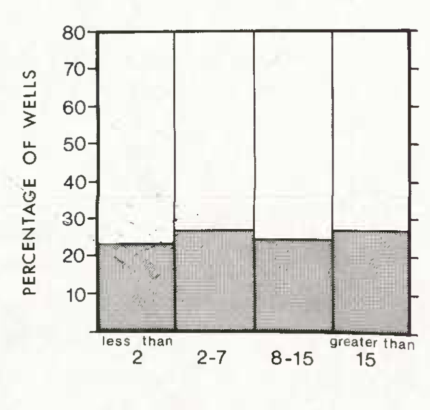


Figure 2. -- Distribution of well yields, Geohydrologic Unit 3 (582 wells).

3

GEOHYDROLOGIG UNIT 3: This is the most widespread unit in the Reisterstown quadrangle and is highly variable. In this quadrangle, it is composed of several geologic formations--mostly schist, with smaller areas of gneiss, marble, serpentinite, and other rock types.

Reported yields of 582 wells in the Reisterstown and surrounding quadrangles range from 0.0 to 100 gal/min and have a median of 6.0 gal/min. Figure 2 shows distribution of well yields calculated from specific capacities.

The range of specific capacities is from 0.00 to 6.1 (gal/min)/ft. The median is 0.15 (gal/min)/ft. The distribution of well yields and specific capacities is dominated by low values, but a small number of wells are rather productive. Because most of the wells analyzed are domestic wells, they may not be indicative of the potential of the aquifer. Improved techniques of well location, construction, and stimulation can result in greater production, but these methods are usually not economical for domestic wells. Well depths range from 36 to 890 ft, and the median depth is 145 ft.

4

GEOHYDROLOGIG UNIT 4: This unit occurs in the northeast and east-central areas of the quadrangle, and in a small wedge in the southeast corner of the map. It is composed of the garnet-staurolite, the garnet-staurolite-kyanite, and the garnet-kyanite facies of the Loch Raven Schist, which are biotite-plagioclase-muscovite-quartz schists containing these accessory minerals. This unit is the least productive unit, with reported yields of 137 wells ranging from 0.0 to 60 gal/min and having a median of 4.3 gal/min. Figure 3 shows distribution of well yields calculated from specific capacities. Specific capacities range from 0.00 to 6.0 (gal/min)/ft and have a median of 0.06 (gal/min)/ft. Depths range from 62 to 600 ft; median depth is 214 ft.

The risk of being unable to obtain a well adequate for domestic use on the first attempt is rather high (22 percent of reported yields were less than the 2 gal/min considered adequate for domestic use). Wells are also generally deeper in this unit, and therefore more expensive. Homes in this unit may require specially designed water-supply systems and conservation methods. (See, for example, Wright, 1977.) The likelihood of obtaining a well capable of meeting demands greater than for domestic use is low.

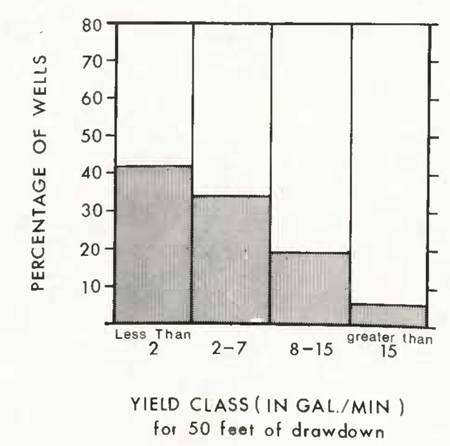


Figure 3. -- Distribution of well yields, Geohydrologic Unit 4 (137 wells).

A total of 736 wells analyzed for the Reisterstown quadrangle and vicinity range in reported yield from 0.00 to 100 gal/min and have a median yield of 6.0 gal/min. Values for upper and lower quartiles of reported yield are 10 and 2.5 gal/min, respectively. Of the total number of wells analyzed, 16 percent were reported to yield less than the 2 gal/min minimum considered adequate for domestic use. Specific capacities range from 0.00 to 6.1 (gal/min)/ft and the median is 0.13 (gal/min)/ft. Mean specific capacity is 0.35 (gal/min)/ft. Figure 4 is a specific-capacity frequency graph for each of the three units. Depths of the wells range from 36 to 890 ft below land surface. Median depth is 155 ft.

○ Well with reported yield less than 2 gal/min.

● Well with reported yield greater than 15 gal/min.

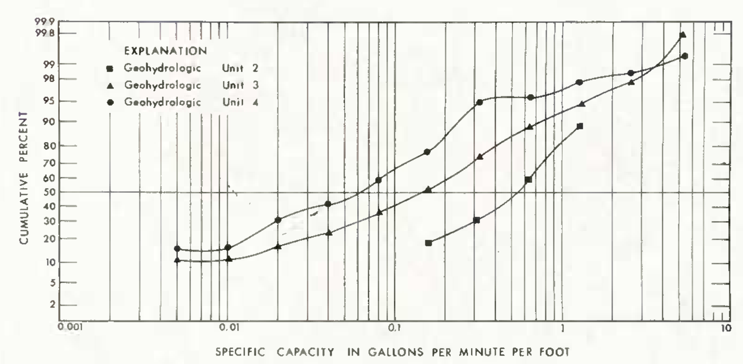


Figure 4. -- Cumulative frequencies of specific capacities of wells in the Hydrologic Units.

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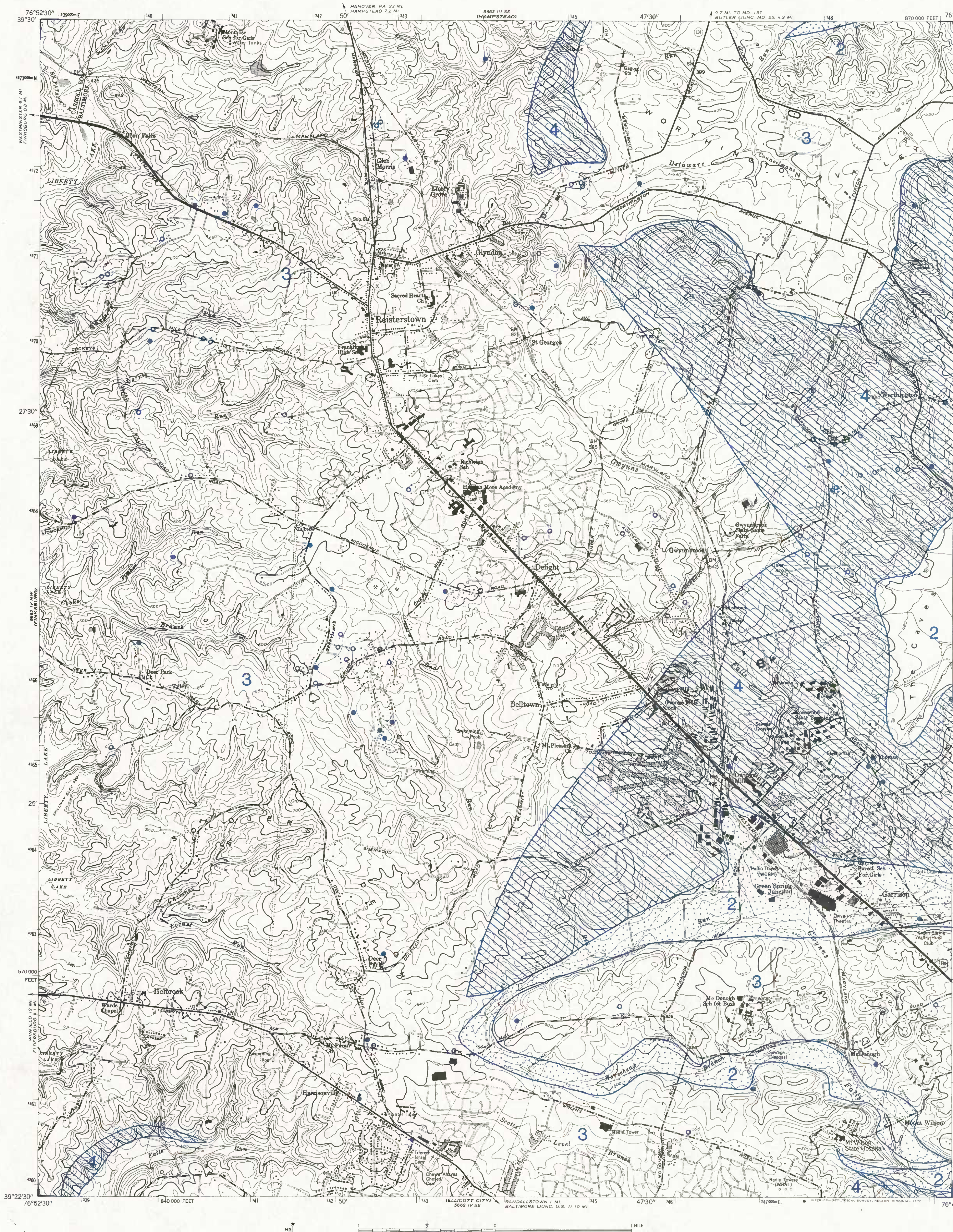

Topography from aerial photographs by photogrammetric methods. Aerial photographs taken 1943. Field checked 1944. Culture revised by the Geological Survey 1953. Photorevised 1974.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

MN GN 8° 142 MILS 1°09' 20 MILS

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

GONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

MARYLAND
QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Department of Planning and Zoning.

1983

GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEM

By Mark T. Duigon

INTRODUCTION

Where centralized sewage systems are not available, wastes from individual homes must be disposed of in comparatively small areas within the boundaries of the lot. These wastes are composed of many different substances including urine, fecal matter, laundry soaps and cleaning compounds, and food scraps--all transported out of the house as a slurry by mixing with large quantities of water. Some of these are toxic, whereas others support bacteria and viruses. If they are not reduced in quantity or deactivated, they may pollute or contaminate the environment.

The usual disposal method is to feed the slurry into a septic tank (to separate the liquid from solids and greases) which releases a partly decomposed effluent into a seepage pit or tile field for infiltration into soil. It is in the soil, or in the saprolite, in most places in the Piedmont, where most of the renovation should occur as the effluent percolates down toward the saturated zone.

Careful construction and maintenance of disposal systems are essential. Negligent construction of tile fields is as common a cause of failure as incorrect soil evaluation or system design (Coulter and others, 1961, p. 17). Lack of periodic maintenance is the primary reason for failure of more than 15 percent of approximately 30,000 individual disposal systems in Baltimore County (Marvin Cook, oral commun., 1978). Systems that operate according to different principles than conventional septic systems may be more effective, but if not maintained properly, they may lose their effectiveness and fail more readily than seepage pits or tile fields combined with septic tanks.

This map indicates the relative degree to which the geohydrologic environment adversely affects the operation of septic systems, based on the constraint factors described below. The following diagram shows the relative degree of these effects among three units:

MAXIMUM CONSTRAINTS	MODERATE AND VARIABLE CONSTRAINTS	MINIMUM CONSTRAINTS
I	II	III

CONSTRAINT FACTORS

1. Flood hazard: Disposal systems do not drain properly when flooded and may be physically damaged. Contamination of surface water is possible when flood waters mix with effluent, and can spread to ground-water supplies.

2. Shallow water table: If effluent enters the ground-water system before it has passed through enough soil for adequate renovation, it will contaminate the system. Baltimore County requires a separation of 4 ft from the base of the seepage system to the water table.

3. Depth to bedrock: Fractures in bedrock act as ground-water conduits, and renovation of effluent is not effective. Therefore, a sufficient thickness of unconsolidated material between the base of the seepage system and the bedrock surface is required.

4. Slope: Steep slopes generally have a thin soil cover and are likely to allow effluent to emerge at the surface. Baltimore and Carroll Counties allow a maximum slope of 25 percent. Sternberg (written commun., 1974) concluded that, where the slope exceeds 20 percent, effluent will come to the surface downslope from a drainfield regardless of soil type or depth of trenches. Slope categories for this map were obtained from Map 2.

5. Infiltration rate: This factor affects the design of the disposal system. If infiltration is too slow, drainage will be sluggish and effluent may back up through the plumbing system. If too fast, renovation will be inadequate. In Maryland, the infiltration rate is evaluated at the site by a percolation test [1/].

Most of these factors are individually evaluated on a broad scale by the U.S. Department of Agriculture, Soil Conservation Service (Reybold and Matthews, 1976). These evaluations are tabulated, providing the values of certain soil properties for each soil mapping unit. The map presented here integrates those evaluations in addition to field observations by the author, other data in this atlas, and consideration of percolation tests by county officials. This map cannot substitute for onsite evaluations, as discussed in the section, Limitations of Maps.

1/ The percolation test in Baltimore County consists of digging at least two holes to bedrock or as deep as the backhoe will dig (about 16 ft). This is to determine if the water table or bedrock surface is high. A lateral extension of the first hole is dug to an approximate depth of 5 ft (initially), and, at the bottom, a 1x1x1-ft hole is hand-dug. This small hole is filled with water to a level of 7 inches. The level is allowed to drop 1 inch and then is timed as it drops a second inch. The test is considered successful if the level takes from 2 to 30 minutes to drop the second inch. If the test fails, it is repeated at a greater depth or at another location. A proposed building lot must have a successful percolation test before a building permit will be issued, if sewage is to be disposed onsite. The testing health official also notes any other factors that may affect operation of the disposal system, such as impermeable layers.

MAP UNITS

UNIT I: Disposal facilities constructed in this unit are likely to fail. The unit generally occurs adjacent to streams and lakes. It is characterized by one or more of the following critical factors: Subject to flooding; water table less than 10 ft below land surface; land slopes exceed 25 percent; the presence of soils having low permeability (less than 0.63 in./hr, equivalent to greater than 95 min/in.). This unit includes soils that have developed on alluvium and are subject to flooding, such as the Codorus silt loam and Hatboro silt loam. It also includes thin residual soils, such as the Chrome series in the Soldiers Delight area, characterized by bedrock depths of 1 to 3 ft. Manor and other soils having slopes greater than 25 percent are in this category.

UNIT II: Conditions in this unit are not as severe as in Unit I, but several factors may combine to affect disposal systems adversely. Onsite evaluation is of particular importance because of variability and, in places, marginality. Unit II corresponds to areas mapped as Manor, Glenelg, or other soils which have moderate (15 to 25 percent) slopes. It also includes areas mapped as Conestoga soils, which formed over calcareous schist and associated marble or limestone, and Neshaminy soils which formed over rocks such as granodiorite and diabase. Also included are areas of scattered outcrops, stony areas, and areas where the land has been modified and is, therefore, variable in several properties. Depths to water table and bedrock vary; for example, depth to bedrock beneath Manor soils is reported as 3 1/2 to 10 ft.

UNIT III: This is the most favorable unit for disposal systems, but inclusion in this unit does not guarantee suitability of a particular site for sewage disposal. This unit is generally found in well-drained interfluvial areas and dominated by Chester, Manor, and Glenelg soils of gentle (less than 15 percent) slopes developed over schist and phyllite. It also includes Elioak and Legore soils of gentle slopes and Baltimore soils having slopes less than 8 percent. Permeability varies (0.63 to 6.3 in./hr or 95 to 9.5 min/in.), but is generally adequate. The water table and bedrock are at depths greater than 10 ft.

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Maryland Geological Survey — Quadrangle Atlas No. 7

MAP 6. GEOHYDROLOGIC CONSTRAINTS ON SEPTIC SYSTEMS

Topography from aerial photographs by photogrammetric methods. Aerial photographs taken 1943. Field checked 1944. Culture revised by the Geological Survey 1953. Photorevised 1974.

UTM GRID AND 1974 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

CONTOUR INTERVAL 20 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

1983

QUADRANGLE LOCATION

Prepared in cooperation with the United States Geological Survey and the Baltimore County Department of Planning And Zoning.

STATE OF MARYLAND
DEPARTMENT OF NATURAL RESOURCES
MARYLAND GEOLOGICAL SURVEY
Kenneth N. Weaver, Director

HYDROGEOLOGIC QUADRANGLE ATLAS NO. 7
REISTERSTOWN QUADRANGLE: GEOLOGY and HYDROGEOLOGY

By
Mark T. Duigon and William P. Crowley

INTRODUCTION

This atlas describes the geology and hydrogeology of the Reisterstown 7 1/2-minute quadrangle in western Baltimore County, Maryland (fig. 1).

The information contained herein is intended for use by planners, health officials, developers, environmental consultants, and the public, who are concerned with baseline hydrogeologic data and the effects of hydrogeologic factors on development.

The climate of this area is humid temperate, with an average annual temperature of 53°F and an average annual precipitation of 43 inches (Vokes and Edwards, 1974, p. 20, 28).

The Reisterstown quadrangle lies within the eastern division of the Piedmont physiographic province and the area has an undulating topography that is typical of that province. The land surface along larger streams is deeply dissected. The topography and drainage are controlled by rock type and structure.

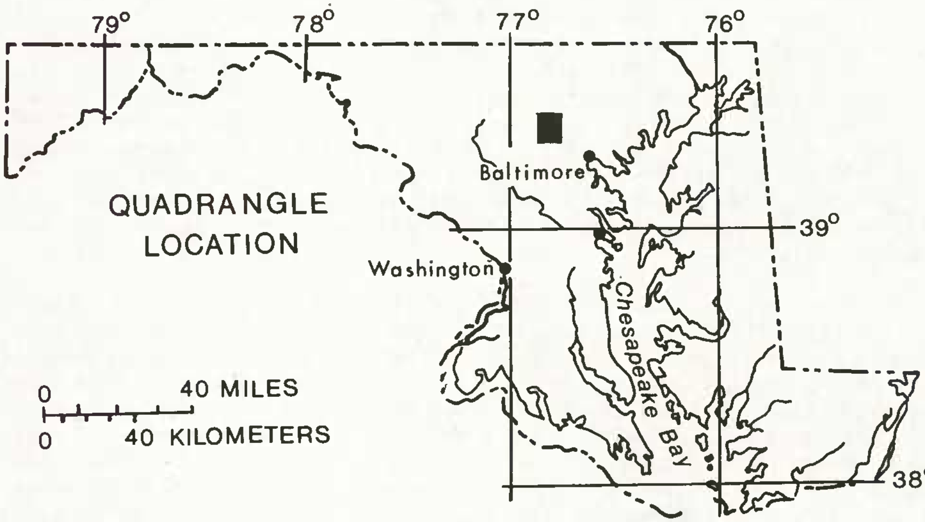

Figure 1.-- Location map

There are parts of four main drainage basins in the Reisterstown quadrangle. The northeastern area is part of the Gunpowder Falls drainage basin. The western area drains into the Patapsco River. The central and southeastern parts drain into Gwynns Falls. A small area at the eastern edge of the quadrangle drains into Jones Falls. The latter two areas are subdivisions of the Patapsco drainage basin.

Magnitudes and frequencies of stream discharges are described by Walker (1971), using U.S. Geological Survey streamflow data. The stream-gaging station on Slade Run, northeast of Glyndon, has been in operation since 1947. Another gage, on Gwynns Falls, was operated for 13 years before it was destroyed in 1972 by tropical storm Agnes. Additional gages are in operation in adjacent quadrangles. Stream characteristics at un-gaged locations can be estimated using physical characteristics of the basin (Walker, 1971).

The Reisterstown quadrangle is bisected by U.S. Highway 140. Commercial and residential development are concentrated along this road and Maryland Highway 26. Commercial development consists mainly of retail-merchant establishments. Elsewhere, land is used for agriculture (chiefly corn), forest and recreation, and horse raising.

Those areas of the Reisterstown quadrangle served with public water are supplied by the Baltimore metropolitan area system, which includes the Loch Raven, Prettyboy, and Liberty surface-water reservoirs.

GEOLOGY

The Reisterstown quadrangle lies entirely within the Piedmont physiographic province. The oldest rocks in the area, the Baltimore Gneiss (of Precambrian age) constitute a basement upon which were deposited marine clastic and carbonate sediments, which were later metamorphosed into schists, quartzites, and marbles. Mafic and ultramafic rocks were thrust into the area by tectonic forces (Crowley, 1976). These forces also led to the development of such structural features as the Texas-Phoenix nappe, the Chattolanee, Phoenix, and Woodstock domes, the Caves anticline, and the Sykesville syncline. The stratigraphic nomenclature used in this report is that proposed by Crowley (1976) and does not necessarily follow the usage of the USGS.

The crystalline rocks have been undergoing chemical weathering and fluvial erosion for at least 130 million years. The present landscape with its hills, valleys and streams has been formed by weathering processes during the last 10 to 15 million years. Throughout the quadrangle the crystalline rocks are mantled by overburden composed of residuum (saprolite) that varies in thickness depending upon the type of rock and topographic position, and alluvium deposited along streams. In places the overburden is thin or absent (steep hillslopes, for example, and in areas underlain by serpentinite); in other places it is 50 feet or more thick (broad upland areas). On the Cockeysville Marble, rock is exposed at the surface in places, and in other areas the residuum may exceed 100 feet in thickness.

Various soils occurring in the Reisterstown quadrangle have been classified and mapped by the U.S. Department of Agriculture, Soil Conservation Service. The major groups are the Chester-Glenelg, Manor-Glenelg, Baltimore-Conestoga-Hagerstown, and Chrome-Watchung associations. The characteristics of these soils are functions of the climate, biology, relief, parent materials, and time since soil formation began. These soils are underlain by both crystalline rocks and alluvium.

HYDROLOGY

Ground water occurs in the intergranular pore space of overburden and in fractures in unweathered crystalline rock in the Maryland Piedmont. Most wells in the Piedmont are drilled through the overburden and into fresh rock. The amount of water that can be produced by such a well is determined in part by the number and interconnection of water-filled fractures that the well bore intersects. Figure 2 shows a generalized Piedmont setting with several wells having different limitations.

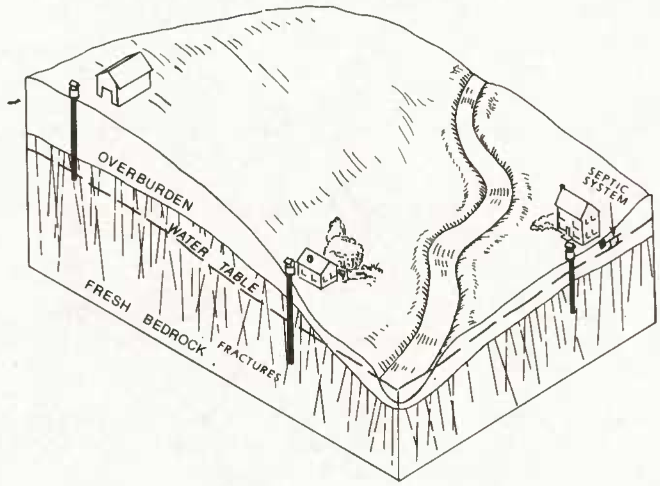

Figure 2. -- Wells in Maryland Piedmont. Well 'A' may go dry during a drought as the water table is lowered. Well 'B' intersects more interconnecting fractures and is assured a good supply, even if the water table is lowered. Well 'C' yields a sufficient amount of water but is subject to contamination from the septic system located up-gradient.

The hydrologic cycle (fig. 3) is the combination of "paths" that water may move along in response to various forces. As the term implies, the various "paths" are not dead ends, but loops which serve to recycle water with negligible net gains or losses. To quantitatively evaluate the hydrologic cycle in a particular region, use is made of the hydrologic budget:

$$P = R + ET + \Delta S$$

where

P = precipitation,

R = runoff,

ET = combined evaporation and transpiration, and

ΔS = change in storage.

Precipitation is the source of ground water in the Piedmont and is balanced by losses due to overland flow (runoff), release to the atmosphere as vapor (evaporation and transpiration), and any change in the amount of water in storage in the ground.

Water quality is affected by the substances with which the water comes into contact. Harmful materials are often filtered out of water as it passes through the ground, but that passage usually results in a higher content of dissolved minerals. The chemical nature of ground water varies because it is mainly a function of the chemistry of the rock through which the water passes. The suitability of water of a particular chemical nature depends on its intended use: water that is fit to drink may not be suitable for certain industrial applications such as steam boilers.

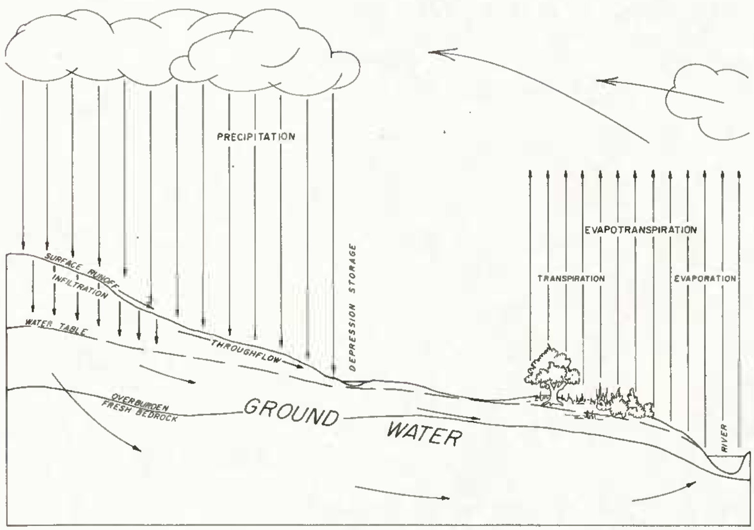

Figure 3. -- The hydrologic cycle

MAPS INCLUDED IN ATLAS

The information in this atlas is presented as six maps, each on a standard 7 1/2-minute topographic quadrangle base:

1. Geology, by William P. Crowley.
2. Slope of the Land Surface, by Maryland Geological Survey.
3. Location of Wells and Springs, by Mark T. Duigon.
4. Depth to Water Table, by Mark T. Duigon.
5. Availability of Ground Water, by Mark T. Duigon.
6. Geohydrologic Constraints on Septic Systems, by Mark T. Duigon.

LIMITATIONS OF MAPS

These maps are designed for broad planning purposes and are not meant to substitute for detailed onsite investigations where required. The boundaries may not be exact because of the scale of the map, data quality and geographical distribution, and judgment required for interpolation and extrapolation.

CONVERSION OF MEASUREMENT UNITS

In this atlas, figures for measurements are given in inch-pound units. The following table contains the factors for converting these inch-pound units to metric (System International or SI) units:

Inch-pound unit	Symbol	Multiply by	For metric unit	Symbol
inch	(in.)	25.40	millimeter	(mm)
foot	(ft)	0.3048	meter	(m)
mile	(mi)	1.609	kilometer	(km)
gallon	(gal)	3.785	liter	(L)
gallon per minute	(gal/min)	0.0631	liter per second	(L/s)
gallon per day	(gal/d)	0.0438	cubic meter per second	(m^3/s)
gallon per minute per foot	[(gal/min)/ft]	0.2070	liter per second per meter	[(L/s)/m]

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1/ The name of this agency was changed to the Maryland Geological Survey in June 1964.

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